Sustainability of a successful health and nutrition program in a remote Aboriginal community

Amanda J Lee, Ann P V Bonson, Daisy Yarmirr, Kerin O'Dea and John D Mathews

Abstract

Objective: To assess the long term effect of a nutrition program in a remote Aboriginal community (Minjilang).

Design: Evaluation of nutritional outcomes over the three years before and the three years after a health and nutrition program that ran from June 1989 to June 1990. Turnover of food items at the community store was used as a measure of dietary intake at Minjilang and a comparison community.

Setting: A community of about 150 Aboriginal people live at Minjilang on Croker Island, 240 km north-east of Darwin. A similar community of about 300 people on another island was used as the comparison.

Results: The program produced lasting improvements in dietary intake of most target foods (including fruit, vegetables and wholegrain bread) and nutrients (including folate, ascorbic acid and thiamine). Sugar intake fell in both communities before the program, but the additional decrease in sugar consumption during the program at Minjilang "rebounded" in the next year. Dietary improvements in the comparison community were delayed and smaller than at Minjilang.

Conclusions: The success of the program at Minjilang was linked to an ongoing process of social change, which in turn provided a stimulus for dietary improvement in the comparison community. When Aboriginal people themselves control and maintain ownership of community-based intervention programs, nutritional improvements can be initiated and sustained.

(Med J Aust 1995; 162: 632-635)

Poor nutrition is a major public health problem for Aboriginal Australians, contributing to premature death and morbidity requiring costly medical interventions.[1,2] In remote areas, diet is poor because of the loss of traditional food supplies, lack of access to good quality foods, and inadequate dietetic services and nutritional education. The diet in such communities is high in sugar and saturated fat, and low in micronutrients.[3]

Due to the community-wide impact of poor nutrition in most remote Aboriginal communities, community-based rather than individualised responses are required. Health service delivery projects have rarely adopted such an approach, and few Aboriginal nutrition projects have been evaluated formally.

In 1989, an unusually successful nutrition project was initiated by the Aboriginal people of Minjilang, a coastal community in the Northern Territory of Australia.[4] The program promoted an increased intake of nutritionally desirable foods, such as fresh fruit, vegetables and wholegrain bread, and discouraged the eating of take-away foods and sugar. Over a year, there was a significant decrease in dietary intake of refined sugar and saturated fat and an increase in the consumption of foods with higher levels of micronutrients.[4] This led to improvements in several indicators of nutritional status, including lower serum cholesterol levels, increased red cell folate levels, serum pyridoxine and plasma ascorbic acid levels, lower blood pressure, and a normalisation of body mass index.[4]

The success of the Minjilang project showed that, in the short term, Aboriginal communities could improve their nutritional status, but failure to sustain such improvements has been commonplace.[5] External funding for the intervention project and biological monitoring ceased in June 1990, but the people of Minjilang have continued the program informally from that time. We report the nutritional outcomes up to 1993.

Menzies School of Health Research, Darwin, NT.
Amanda J Lee, BSc, DipDiet, PhD, Senior Research Officer.
Ann P V Bonson, RAHW, Aboriginal Health Worker.
John D Mathews, AM, MD, PhD, Robert Menzies Professor and Director.
Northern Territory Department of Health and Community Services, Minjilang, NT.
Daisy Yarmirr, RAHW, Aboriginal Health Worker.
Deakin University, VIC.
Kerin O'Dea, BSc, PhD, Professor, Pro Vice Chancellor, Research.
No reprints will be available. Correspondence: Dr Amanda Lee, 263 Edward Street, East Brunswick, VIC 3870.

Methods

Communities: Minjilang is a small community of about 150 people on Croker Island, 240 km north-east of Darwin in northern Australia. A second, "comparison" community of about 300 people is also located on an island off the north coast, but for the report wished to remain anonymous. Each community is served by a single community store managed by the Aboriginal-owned Arnhem Land Progress Association. Alcohol is not legally available in either community. Community medical and nutritional services are provided in each community by the Northern Territory Department of Health and Community Services.

Nutrition program: In 1989, Aboriginal health workers at Minjilang asked for nutrition advice after two young men

died suddenly from heart disease. This initiative led to the development of the Minjilang Health and Nutrition Project (see Box), technically supported from outside, but controlled by the community. Details of the program and its short term evaluation are reported elsewhere.[4]

Long term assessment: We evaluated the long term impact of the program using a non-equivalent-group, time-series design,[6] in which the three years before intervention were compared with the three years after.

Store turnover of foodstuffs was used as a measure of dietary intake at the two communities. With the approval of the community councils and the Arnhem Land Progress Association, store invoices were used to list all food items delivered to each store during the 12 weeks to the beginning of June in each year.[3,7] Mean store turnover was assumed to approximate the mean dietary intake of the community.

As accurate population data were available only for June 1989 to June 1990, results are reported as nutrient densities (nutrient content per 1000 kJ), the percentage contribution of macronutrients to total community energy intake or the proportion of nutritionally preferred food lines; these measures are essentially independent of population size and enable comparison between communities and within communities over time.[3,4] However, turnover of key food items was also calculated as approximate daily intake per capita to identify dietary components changing over time.

Results are described qualitatively as the data were not suited to formal statistical testing and there were many confounding factors.

Ethical approval: The study was conducted at the invitation of the community. Ethical approval was granted by the Joint Institutional Ethics Committee of the Royal Darwin Hospital and Menzies School of Health Research, which is formally constituted under National Health and Medical Research Council guidelines, with Aboriginal representation.

Dietary aims of the Minjilang Health and Nutrition Project

Major target foods*	Primary target nutrients
↑ Fresh fruits and vegetables	↑ Folate ↑ Ascorbic acid ↑ ß-Carotene ↑ Percentage of energy derived from complex carbohydrate ↑ Dietary fibre
↑ Cereals: Wholegrain breads	↑ Thiamine ↑ Percentage of energy from complex carbohydrate ↑ Dietary fibre
↓ Sugar	↓ Percentage of energy derived from sugars
↓ Sweetened carbonated beverages (↑ Artificially sweetened beverages)	↓ Percentage of energy derived from sugars
↓ Fatty take-away foods	↓ Percentage of energy derived from fat ↓ Percentage of energy derived from saturated fat

*Foods targeted at Minjilang during the intervention; these were selected after a pre-intervention assessment of diet.[4]

Results

Foods

See Figure 1. At Minjilang, the increased turnover per capita of fruit, vegetables and bread achieved during the intervention was maintained in the subsequent year. In the comparison community, an increased turnover of fruit and vegetables was not seen until June 1991 and the turnover of bread remained much lower than at Minjilang.

In both communities, the turnover of sugar decreased from 1987 to June 1990, but the marked decrease in sugar turnover during the intervention and the following "rebound" at Minjilang were not observed in the comparison community.

Although the turnover of take-away foods remained relatively low after intervention at Minjilang, this should be seen against the unusually high turnover beforehand, which followed the upgrade of take-away facilities in May 1988.

The proportion of store-purchased beverages that were low-sugar "diet" drinks increased from less than 3% to 15% at Minjilang during the intervention period and remained at this level afterwards. Wholegrain bread increased from 8% to 24% of the total bread turnover during the intervention, but decreased to 14% after June 1990. In the comparison community, the pro-

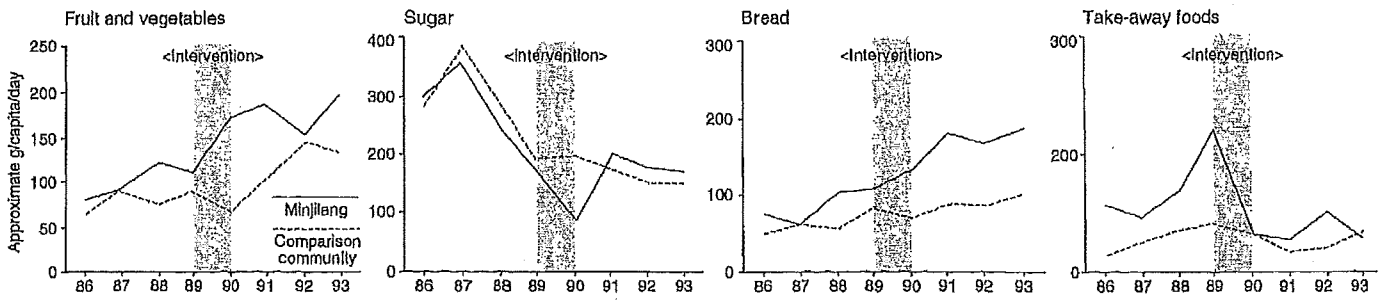

Figure 1: Approximate intake of key foods at Minjilang and the comparison community, 1986–1993.

Dietary intake at Minjilang*

	June 1986	June 1987	June 1988	June 1989	June 1990	June 1991	June 1992	June 1993	Mean before intervention	Mean after intervention
Percentage of energy										
as total fat	20.7%	18.8%	20.2%	33.5%	27.2%	24.7%	25.1%	23.9%	23.3% ± 5.9%	25.2% ± 1.2%
as saturated fat	8.3%	8.3%	7.2%	13.4%	10.0%	7.8%	8.0%	7.7%	9.3% ± 2.4%	8.4% ± 0.9%
Polyunsaturated:saturated fat ratio	0.50	0.38	0.56	0.47	0.54	0.60	0.70	0.56	0.48 ± 0.06	0.61 ± 0.07
Percentage of energy										
as complex carbohydrate	27.4%	28.7%	31.9%	26.8%	32.9%	32.1%	30.0%	32.1%	28.7% ± 1.9%	31.8% ± 1.1%
as refined sugars	44.6%	45.8%	39.1%	29.9%	28.5%	33.5%	33.8%	33.4%	39.9% ± 6.3%	32.3% ± 2.2%
as protein	7.3%	6.7%	8.8%	9.8%	11.4%	9.7%	11.1%	10.6%	8.15% ± 1.22%	10.7% ± 0.64%
Density of fibre (g/1000 kJ)	0.92	0.83	1.17	1.29	1.55	1.30	1.24	1.27	1.05 ± 0.19	1.34 ± 0.12

*Assessed by measuring turnover of food items at the community store.

portion of wholegrain bread was consistently less than 8% of the total bread turnover, and the proportion of "diet" drinks was less than 3%, but increased to about 8% from June 1991.

Nutrients

The percentage of energy derived from fat and saturated fat continued to decrease at Minjilang after the intervention, while the increased proportion of energy derived from complex carbohydrate was maintained. The percentage of energy derived from refined sugars was significantly lower after the intervention than before, although the major decline occurred before the intervention. A similar decline was seen in the comparison community before June 1989. These changes were complemented by an increase in energy derived from fat in June 1989, particularly at Minjilang (Table). However, after 1990 the proportion of energy from sugars increased again at Minjilang. Interpretation of these changes is made more difficult because of an apparent decrease in total energy consumption at Minjilang between June 1989 and June 1990.[4] From June 1992 the contribution of refined sugars to total energy was relatively constant, but was consistently lower at Minjilang.

From 1986 to 1993, the proportion of total energy derived from fat was lower at the comparison community than at Minjilang. The contribution of fat to total energy intake increased at Minjilang from June 1988 (in line with the increasing supply of take-away foods) and began to fall during the intervention, remaining relatively stable after June 1991. There was a trend for the percentage of total energy derived from fat to increase slightly at the comparison community over the entire period.

Dietary density of folate, ascorbic acid, ß-carotene and thiamine was similar in both communities before June 1989 (Figure 2). There were marked and significant increases in the dietary density of these vitamins in Minjilang over the intervention period. Dietary density of folate and thiamine decreased at Minjilang immediately after the intervention, but remained above pre-intervention levels, as did dietary density of ascorbic acid and ß-carotene. At the comparison community, density of folate, ascorbic acid and thiamine was relatively consistent until June 1991 and, despite subsequent increases, tended to remain lower than at Minjilang.

Discussion

Dietary results

Before June 1989, diets at both Minjilang and the control community were similar to those of other Aboriginal communities: intakes of energy, refined sugars and fat (particularly saturated fat) were excessive and nutrient densities were low.[3,4] The diet lacked variety, with dietary preferences for meat, fat and "sweetness" that had not changed from traditional times.[8] Such conservative dietary preferences, together with evidence that traditional Aboriginal beliefs do not relate diet and health,[9] point to the difficulties of achieving nutritional change.

However, dietary change, particularly decreasing sugar intake, had begun at both communities well before the intervention itself. This suggests that the communities were already aware of at least some of the hazards of a "Western" diet.

The dietary changes measured during the intervention at Minjilang were in line

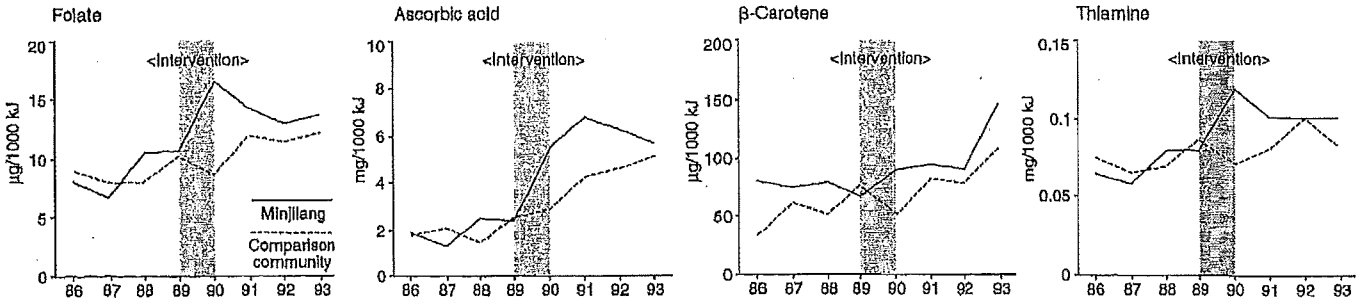

Figure 2: Key nutrient densities in foods consumed at Minjilang and the comparison community, 1986–1993.

with simple nutritional messages developed to correct the inadequate baseline diet.[4] Changes in intake of key foods at Minjilang were reflected in improvements in relevant nutrient densities over the intervention period (Table; Figure 2).

After formal completion of the intervention project, turnover of fruit and vegetables, bread (particularly wholegrain bread) and artificially sweetened carbonated beverages continued to be higher than before the intervention and was also higher than at the comparison community. In contrast, the turnover of sugar increased in a temporary "rebound" effect.[10] However, the daily intake per capita of refined sugars at Minjilang immediately before and after the intervention was lower than that measured at other Aboriginal communities,[3] including the comparison community, and the intake of sugar as a percentage of total energy was lower after intervention than before (Table).

These dietary changes provide evidence for the sustainability of the "positive" aspects of the Minjilang nutrition program, which promoted an increased intake of nutritionally desirable foods. Conversely, "negative" advice to decrease the intake of foods that were not nutritionally desirable was not so sustainable in the long term.

As nutritionally desirable Western foods were promoted as being most similar to traditional Aboriginal foods,[4] this suggests that reinforcement and affirmation of traditional Aboriginal cultural concepts and food knowledge are more likely to succeed in the long term than a focus on the negative aspects of Western foods.

Results from the comparison community showed some dietary improvements dating from June 1991; that is, from a year after formal completion of the intervention project at Minjilang. Several factors that may have contributed to these improvements were triggered by the success of the project at Minjilang. These included the initiation of the Arnhem Land Progress Association store nutrition policy in May 1990,[11] the development of a heart health screening program in August 1992 by local Aboriginal health workers and the Northern Territory Department of Health and Community Services, and a greater awareness that Aboriginal communities could achieve improvements in dietary intake, nutritional status and health.[5]

Social determinants of the successful project

Although nutrition strategies that are successful, cost-effective and sustainable should be suitable for other Aboriginal communities, levels of success are likely to vary.[11] Other projects may benefit from an understanding of some of the unusual features of the experience at Minjilang.

The Iwadja and Marrgu of Croker Island obtained inalienable freehold title to their land in 1976. Traditional beliefs and values are still strong, cultural pride is clearly evident and there is a high degree of social cohesion, with stable, traditionally based power structures. Alcohol is legally prohibited in the community.

The intervention project was initiated by the people of Minjilang and, although an effective partnership between community members and those providing technical support was critical to success, the "ownership" of the program remained firmly within the community. Community members were involved actively in all stages of development, implementation and evaluation.[4] Such community control and participation is essential to strengthen community "competence" and critical to the fulfilment of self-determination for Aboriginal people.[12,13]

Effective strategies applied at Minjilang were targeted specifically to community needs.[4] These strategies brought about structural change to make healthier food choices easier, and assisted community members to make informed health decisions[2] and develop the confidence to take long term control over factors impinging on their health.

In Aboriginal communities, nutrition problems are very complex and are not due solely to lack of knowledge about contemporary foods. They will not be alleviated by nutrition education alone, but require social and political action within the framework of community development programs. In particular, appropriate health interventions in Aboriginal communities must address structural and environmental factors and decrease dependency on non-Aboriginal organisations.

Acknowledgements

Financial support was provided by the Public Health Research Development Committee of the National Health and Medical Research Council through the award of a Project Grant to Amanda Lee. We thank Lori Katarski of the Arnhem Land Project Association for arranging access to store invoices. Special thanks to the people of Minjilang.

References

1. Thomson N. A review of Aboriginal health status. In: Reid J, Trompf P, editors. The health of Aboriginal Australia. Sydney: Harcourt Brace Jovanovich, 1991: 37-79.
2. National Health and Medical Research Council. Implementing the dietary guidelines. Report of the subcommittee on nutrition education. Canberra: NHMRC, 1989.
3. Lee AJ, Mathews J, O'Dea K. Apparent dietary intake in Australian Aboriginal communities. *Aust J Public Health* 1994; 18: 190-196.
4. Lee AJ, Bailey A, Yarmirr D, O'Dea K, Mathews JD. Survival tucker: improved diet and health indicators in an Aboriginal community. *Aust J Public Health* 1994; 18: 277-285.
5. Sykes B. An analysis of the difficulties confronting Aboriginal community-controlled nutrition programs. *Proc Nutr Soc Aust* 1977; 2: 32-36.
6. Cook TD, Campbell DT. Quasi-experimentation. Design and analysis issues for field settings. Chicago: Rand McNally Publishing, 1979.
7. Lee AJ, Smith A, Bryce S, et al. Measuring dietary intake in Australian Aboriginal communities. *Ecology Food Nutr* 1995. In press.
8. Lee AJ. The transition of Australian Aboriginal diet and meal patterns. *World Rev Nutr Diet* 1995. In press.
9. Reid J. Body, land and spirit: health and healing in Aboriginal society. St Lucia: University of Queensland Press, 1982: 91.
10. Green LW. Evaluation and measurement: some dilemmas for health education. *Am J Public Health* 1977; 67: 155-161.
11. McMillan SJ. Food and nutrition policy issues in remote Aboriginal communities: lessons from Arnhem Land. *Aust J Public Health* 1991; 15: 281-285.
12. Goeppinger J, Baglioni AJ. Community competence: a positive approach to needs assessment. *Am J Community Psych* 1985; 13: 507-523.
13. Green LW, Kreuter MW. Health promotion planning. An educational and environmental approach. Mountain View: Mayfield Publishing Company, 1991.

(Received 11 Nov 1994, accepted 21 Apr 1995) □